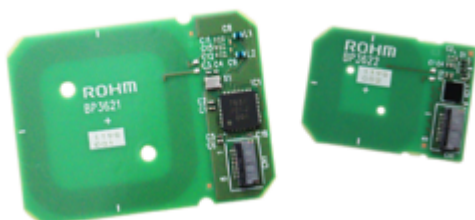


VISIT ROHM



WIRELESS CHARGER MODULES BP3621/ BP3622

COMPACT 13.56MHZ (NFC) MODULES
ENABLE WIRELESS POWER SUPPLY
FOR SMALL AND THIN DEVICES



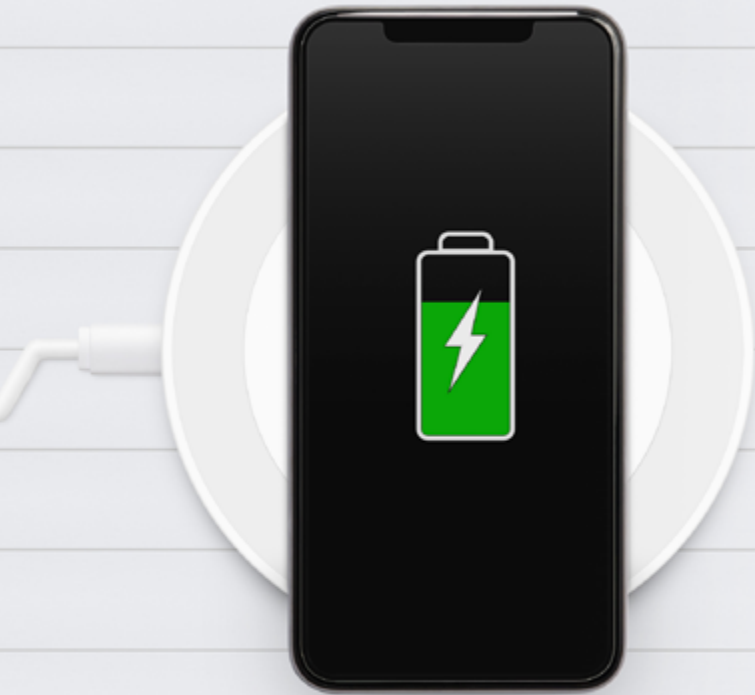
The BP3621(wireless power transceiver modules) and BP3622 (wireless power receiver modules) are compact wireless charger modules with integrated compact antenna boards that easily enable wireless power supply functions in small devices such as smart tags and smart cards, as well as wearables. The new modules use the NFC13.56 GHz frequency range.

Wireless charging also known as wireless power transfer, is the technology that enables a power source to transmit electromagnetic energy to an electrical load across a determined air gap, without interconnecting cords.

This technology is attracting a wide range of applications, from low-power smart watches to high-power electric vehicles because of its convenience, design flexibility and better user experience. Nowadays, wireless charging is rapidly evolving from theories toward standard features on commercial products, especially smartphones and wearables.

The benefits of wireless charging compared to traditional cable charging:

- ***It improves user-friendliness as the hassle from connecting cables is removed. Different brands and different models of devices can also use the same charger.***
- ***It renders the design and fabrication of much smaller devices without the attachment of batteries.***
- ***It provides better product durability (e.g., water-proof and dustproof) for contact-free devices.***
- ***It enhances flexibility, especially for the devices for which replacing their batteries or connecting cables for charging is costly, hazardous, or infeasible (e.g., body-implemented sensors).***
- ***Wireless charging can provide power requested by charging devices in an on-demand fashion and thus are more flexible and energy-efficient.***

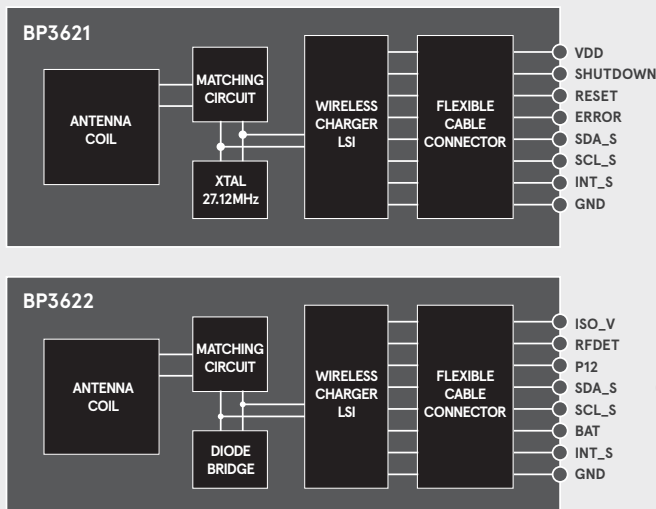


However, current Qi standard in wireless charging is based on low frequency at 110 kHz to 200 kHz and the size of antennas are too large to fit in miniaturized products. Therefore, there are increasing expectations for standards and methods that can be used more universally in small devices. In addition, the efficiency of the wireless power function varies depending on the shape, size, and distance of the antenna. Implementing this function requires repeated prototyping, adaptation, and evaluation on the part of the electronic device, which implies a high development cost for antenna and layout design.

With this in mind, ROHM has developed 13.56 MHz wireless charging modules that makes it easy to implement a wireless power supply function in compact and thin devices.

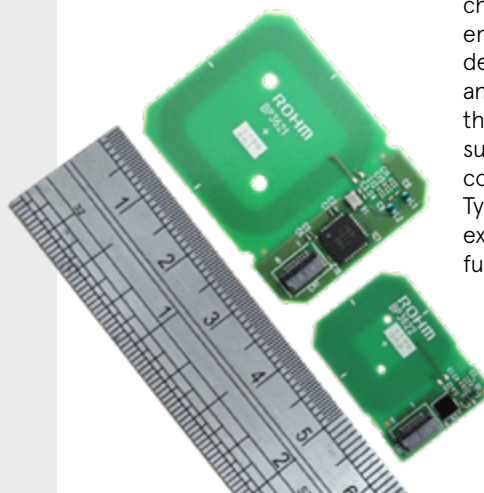
The BP3621 (wireless power transceiver modules) and BP3622 (wireless power receiver modules) are small, board-integrated modules ideal for building wireless power supply systems using a high frequency band of 13.56 MHz. It can be easily used in very small equipment with flat limited back side size.

In addition, the power transmitter module and the power receiver module have built-in software related to wireless charging and NFC Tag communication and are optimized for efficient charging. By using these in pairs, it is possible to reduce phases such as prototyping, redesign, evaluation, etc. necessary for optimization of power supply efficiency.



The new products are small modules of approximately 20mm to 30mm square size that incorporate optimal antenna (coil) layout design technology to build a compact wireless power supply system capable of supplying up to 200mW of power.

In addition to facilitating mounting in small and thin devices, where wireless power supply has been difficult to achieve, the full-flat back side of the board structure contributes to greater flexibility in chassis design. By using ROHM wireless charger modules, you will empower your final product design with a validated plug and play solution. Furthermore, the built-in antenna can support bi-directional data communication and NFC Forum Type3 Tag, contributing to the expansion of communication functions for applications.





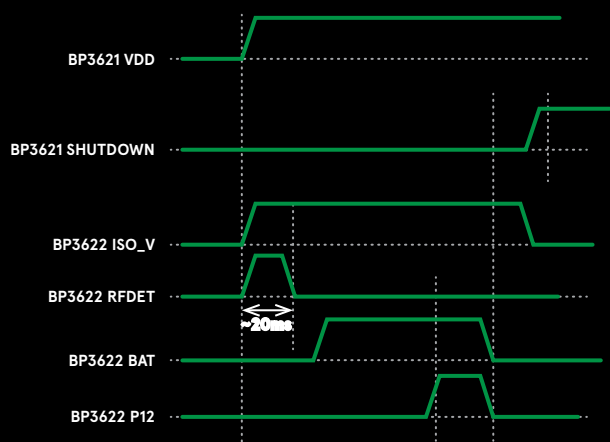
MAIN APPLICATION

Small devices such as smart tags, smart cards and ID cards, PC peripherals such as mice and remote controls, small devices for healthcare.

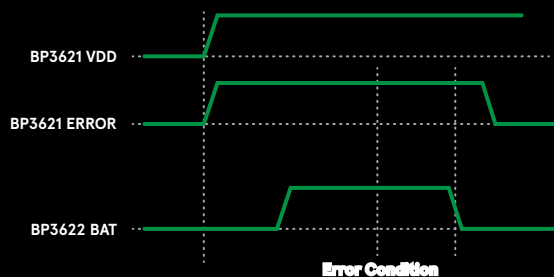
TIMING CHART

The timing chart is described for basic power supply operation. The power supply operation begins with the VDD input, and outputs from BAT.

The behavior of each terminal from the P12 opening at full charge to the charging stop and SHUTDOWN notification is as follows.



The behavior when an error occurs during charging is as follows.



EXAMPLE OF CHARGING FUNCTION

The BP3621/BP3622 each have a 0.5mm pitch, 8-pin FPC connector as host interface, which can be connected to the user's board via a cable. To start the charging process, the BP3621 must be switched on and the BP3622 placed at a distance of 10 mm. During power supply, charging is stopped about once every minute, and the status is checked between power transmitter and power receiver.

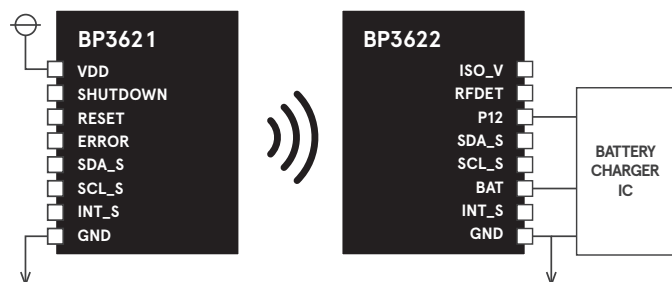
The BP3621 can be operated simply by connecting VDD and GND. When the opposing BP3622 is powered, it outputs a voltage from the BAT pin.

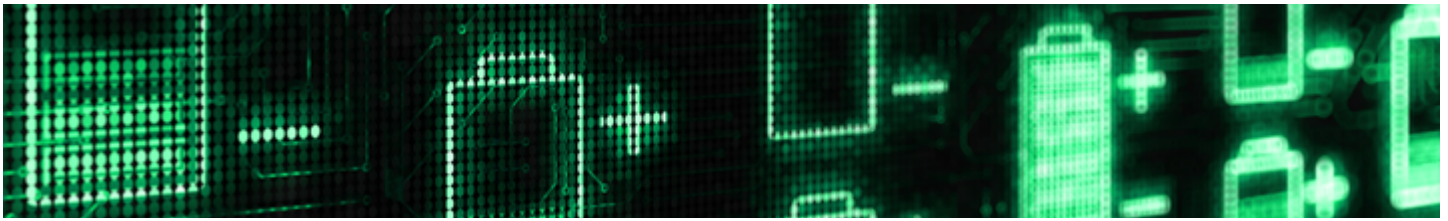
The connection with the BP3622 connects BAT, GND and P12, which is the status signal for charge control. P12 continues to output from the BAT pin for "L" and notifies BP3621 to stop powering when it reaches "H".

The product is adjusted so that power supply is most efficiently when both antenna centers are aligned and the distance between the antennas is 10mm. Please refer to the data sheet

for the range that can be supplied with this product. Because the range of power can be supplied varies depending on the load, the distance between coils, the alignment and surrounding metallic parts.

It is important to carefully evaluate the received wireless power depending on the positional relationship in a full assembled system. The BP3622 defines the operating range with a load resistance value. If the load current is large (the load resistance is small), the output voltage may be less than the specified value. At that time, the power transmission from BP3622 to BP3621 will be adjusted. This behavior is called power supply adjustment, and it may be repeated multiple times until the output voltage stabilizes. In addition, if the output voltage is not stable even after multiple power supply adjustments are performed, the BP3621 stops power transmission and signal an error. In that case, the load current should be adjusted because it is not in a stable output state.





FEATURES OF THE NEW PRODUCT

1

Integrated Antenna Module Reduces the development phase and Facilitates Wireless Power Feed Function

The new products are modules with an integrated antenna board that incorporates ROHM's proprietary simulation-based antenna design technology, matching adjustment, and board layout design technology to reduce wiring loss. By using the power transmitting module and power receiving module in pairs, a maximum of 200mW of power can be supplied. Compared to the case where the antenna and control circuit are configured separately, the power feed characteristics are guaranteed, enabling product evaluation without antenna design and layout design or power feed evaluation. This significantly reduces development man-hours and the design load for board modification and makes it easy to implement a wireless power feed function.

2

Adoption of 13.56MHz high frequency band realizes module miniaturization and contributes to greater flexibility in chassis design

The new products use a 13.56MHz high frequency band magnetic field resonance method to reduce the size of the antenna for small devices such as smart tags and wearables. ROHM achieved a compact module with a built-in antenna, matching circuit and wireless charger IC, which was difficult to achieve with existing wireless power supply standards. In addition, as a wireless power supply product, it is not only waterproof and dustproof by eliminating contact terminals, but also contributes to simplification of the housing structure and improvement of design flexibility by facilitating attachment to the housing through a full-flat back side board structure with all mounted components on the surface.

3

The module's built-in antenna contributes to the expansion of data communication functions in applications

Since the new products use the same 13.56MHz high-frequency band as the NFC communication standard, the module's built-in antenna can support both power feeding and communication. The BP3621 and BP3622 are equipped with an I2C slave function. Data can be exchanged between them by issuing a command from the I2C master. The wireless communication speed of the modules is 212 kbps, and it is possible to transmit up to 256 bytes with one transmission. In addition, since BP3622 supports NFC Type3 tag communication,

The module's built-in antenna contributes to the expansion of data communication functions in applications

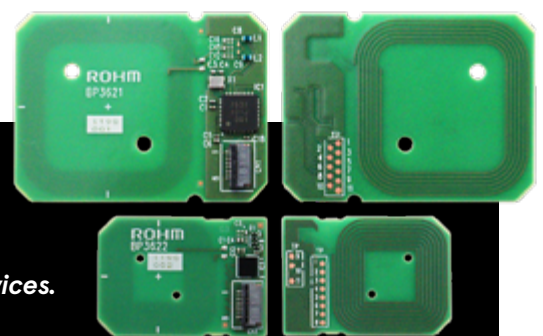
tag information can be read from NFC readers such as smartphones.

All this contributes to the expansion of data communication functions for applications such as firmware downloading, secure data transfer and rewriting of sensor data, device information, and authentication information, and transfer of battery output voltage values. It contributes to the expansion of data communication functions of applications.

SUMMARY

Wireless power technology offers the possibility of removing the last remaining cord connections required to replenish portable electronic devices.

This promising technology has significantly advanced during the past decades and introduces a large amount of user-friendly applications. In this article, we have presented the compact 13.56MHz (NFC) Charger Modules BP3621/BP3622 with integrated antenna boards that easily enable wireless power supply functions in small devices such as smart tags and smart cards, as well as PC peripherals. ROHM plans to continue to expand its lineup of compact shapes and high-power modules in order to expand the range of applications they can support.


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